PORT estimation of parameters of extreme events through generalized means

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In many areas of application, like environment, finance, insurance, statistical quality control, and on the basis of a transformed sample, which can be considered weakly dependent and stationary from an unknown model F, it is a common practice to estimate different parameters of extreme events. Among them, we refer the *value-at-risk* (VaR) at a small level q, a high quantile of probability $1-q$, with q often smaller than $1/n$, where n is the size of the available sample. The semi-parametric estimation of these parameters depends heavily on a reliable and adequate estimation of the *extreme value index* (EVI), one of the primary parameters of extreme events. It happens that most of those semi-parametric estimators do not enjoy such adequate behavior. For instance, most EVI-estimators are not location-invariant, an EVI property, and most VaR-estimators do not suffer the appropriate linear shift in the presence of linear transformations of the data, as does any theoretical quantile. For heavy tails, i.e. for a positive EVI, new VaR-estimators were introduced with such a behavior, the so-called PORT VaR-estimators, with PORT standing for *peaks over a random threshold*. Regarding EVI-estimation, new classes of PORT-EVI estimators, based on powerful generalizations of the Hill EVI-estimator were recently introduced. Now, also for heavy tails, we discuss the use of new classes of estimators with the aforementioned adequate behavior, using classes of EVI-estimators related to the Hill EVI-estimators, but based on adequate generalized means.

Key Words: extreme value theory; generalized means; heavy tails; Monte-Carlo simulation; semi-parametric estimation.